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ABSTRACT

This module, one of 25 on vocational education training for careers in environmental health occupations, contains self-instructional materials on using air-purifying respirators. Following guidelines for students and instructors and an introduction that explains what the student will learn are three lessons: (1) describing how air flows through an air-purifying respirator, and disassembling a respirator and telling how each part works; (2) cleaning and inspecting each part of the respirator, and reassembling it for storage and use; and (3) fitting a respirator so it makes a proper seal on one's face, and testing that fit using various types of qualitative fit tests. Each lesson contains objectives, recommended methods and locations for practice, performance criteria, equipment and supplies to perform a task, detailed step-by-step instructions for learning a task, and performance exercises. Two performance tests cover cleaning, inspecting, and reassembling of dual-cartridge, air-purifying respirators; and performing qualitative fit tests. (CT)

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ED204568

Using Air-Purifying Respirators

Module 9

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U.S. DEPARTMENT OF EDUCATION, Office of Vocational and Adult Education

FOREWORD

The Curriculum and Instruction Branch of the Office of Vocational and Adult Education, U.S. Department of Education, identified a need to improve the training opportunities for vocational education students interested in pursuing careers in environmental health. To fulfill that need, Consumer Dynamics, Inc., a Rockville, Maryland, based company, was awarded the contract to develop performance-oriented, competency-based modules in the environmental health sciences.

USING AIR-PURIFYING RESPIRATORS is one of the modules in the series, "Vocational Education Training in Environmental Health Sciences." The module content is based on selected materials in the environmental health field. The module is intended to supplement existing course materials.

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USING THESE SELF-INSTRUCTION MATERIALS

This self-instruction learning package or module is designed to allow both students and instructors flexibility of use. Although primarily intended for use in existing training programs, the module can be used by anyone interested in learning new skills or perking up old ones. Therefore, two sets of guidelines are presented--one set addressed to students and the other set addressed to instructors. First, find out how you, the student, should use the materials in this book.

GUIDELINES FOR STUDENTS

Take the Performance Test as a pretest.

When you pick up this book and work through it, your goal will not be a letter grade or a high score on an exam. Instead, you will work to develop skills that you can measure. You will not have to worry about how well someone else is doing. Before you start work on this book, you should, first, find out if you have sufficient skills to start training by reading through the section called PERFORMANCE TEST. If you think you can perform each item as specified, ask your instructor to obtain the necessary equipment and supplies so that you can demonstrate your skill level.

Work on parts you need to practice.

If you do everything well, according to the criteria in the Performance Test guidelines, you will not need to spend time working on this module. If, after taking the Performance Test you discover there are parts of the module you need to practice, follow the key to each item in FOR FURTHER STUDY.

Work straight through each lesson in the order presented.

Should you decide to completely work through this book, begin with the INTRODUCTION and go straight through each of the three lessons. The lesson begins with the OBJECTIVE of the training. Follow the instruction for each part in the order presented. Practice each step in a lesson until you can do it according to the criteria stated for the step. At the end of a lesson, do the EXERCISES. When there are audiovisuals listed at the end of a lesson, ask your instructor for help in obtaining them.

Take the Performance Test as a posttest.

Finally, after you have mastered the exercises, ask your instructor to watch you clean, disinfect, inspect, reassemble, and perform the fit tests for a dual cartridge, air-purifying respirator. The guidelines in the Performance Test can be used as a posttest to evaluate the quality of your performance.

GUIDELINES FOR INSTRUCTORS

Approach

The approach of these materials is to provide the student with (1) the nomenclature and uses of the components of the dual cartridge, half-face, air-purifying respirator; (2) procedures for maintaining the respirator; and (3) procedures for fit testing the respirator. The lessons are sequential in that the information presented in the previous lesson serves as a basis of skill development in a later lesson. Exercises are provided to guide the student's practice of the procedures presented in GETTING THERE--STEPS.

Use of the Performance Test

A Performance Test is provided to serve as a guide to the skill development progress. If a student is able to demonstrate skill development by meeting the criteria for performance given in each test item, further study is not needed. Therefore, the student should be given the option of entering training at any point. To determine at what point to start, the student should take the Performance Test as a pretest. At any time during the course of study the student should also be allowed to test out of the remaining portions of training.

Also, the student's capability to accurately complete the entire task in a timely manner can be evaluated by using the Performance Test as a posttest. The items listed in the test can serve as a basis for developing other sets of procedures applicable to other types of air-purifying respirators.

USING THESE SELF-INSTRUCTION MATERIALS

Independent Study

This module is designed to enable the student to work independently under whatever time constraints you deem reasonable. However, depending on the skill level of the students with whom you are working, you may find it desirable to start a group together at the same time with a demonstration and informal presentation on the contents of the module.

As a Laboratory Workbook

Alternatively, you may choose to use this module as a laboratory workbook in a structured laboratory session. With this option, you allow students greater access to your assistance, especially in watching them perform the pre- and posttest portions of the training.

General Instructions

Read through each lesson to anticipate what equipment and supplies you will need to make available for students to use. Also, order any audiovisuals or reading materials you think may present a complementary perspective to the training in this module.

Specific Instructions

Remind students that knowledge of how to wear, clean, inspect, and fit test a dual cartridge,* air-purifying respirator is only a part of the respirator protection program. Before instruction in this module begins, it is recommended that instructors provide sufficient information about how to select an appropriate respirator. Different types of respirators prevent hazardous exposures to airborne dusts, mists, gases, vapors, and fumes. Detailed information is available from the references, including NIOSH's "A Guide to Industrial Respiratory Protection."

*Organic vapor cartridge.

INTRODUCTION

BACKGROUND

In nearly every type of industry there is a chance that, at some point in an industrial operation, potentially harmful substances are released into the air that workers breathe. Most of the time such releases are only temporary and may last a few minutes or a few hours. It is during those times that the wearing of some type of respiratory device becomes necessary to prevent exposure to illness and disease-producing substances floating in the air.

The Occupational Safety and Health Administration (OSHA), under authority from Congress, passes laws to ensure that workers are provided with protection against airborne contaminants (substances suspended in the air). These laws require employers to start a respiratory protection program wherever harmful substances are released into the workplace. The program must be maintained until adequate methods are found that prevent hazardous exposures without the routine use of respirators. The program must include information about using different types of respiratory devices in different types of contaminated air. The information contained in this module can only be used to supplement information provided in such a respiratory protection program.

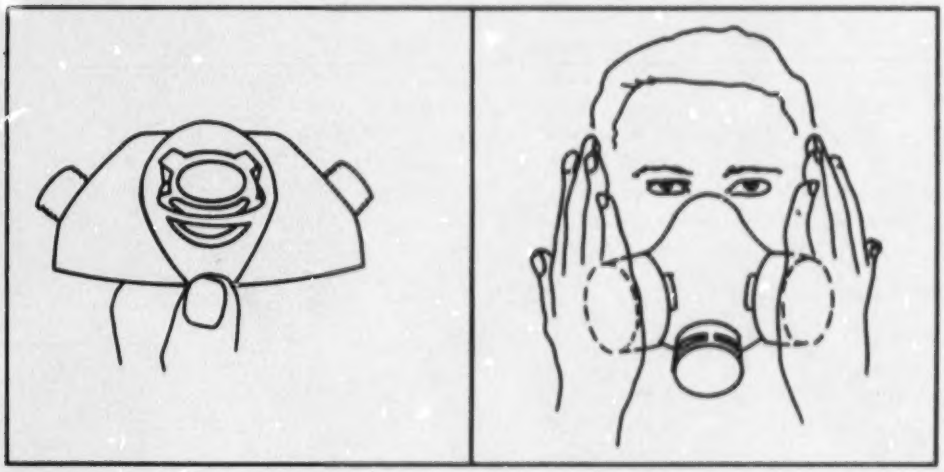
One type of routinely used respiratory device is the dual cartridge, air-purifying respirator, the subject of this module. When specific cartridges are used, the respirator can be used to prevent exposures to specific kinds of airborne contamination. Because the respirator only filters air, it must be worn in air that would be otherwise be breathable. Some air-purifying respirators include full facepieces. Half-mask facepieces are also routinely used. The respirators should not be used in air containing material that could cause eye irritation.

During the time a respirator is worn, its surfaces can become damaged and dirty. To make sure it keeps working as it was intended, it has to be carefully cleaned, disinfected, and inspected as often as needed. The way it fits on the wearer's face must also be periodically checked. If a respirator is not specifically assigned to anyone in particular, it must be cleaned, disinfected, inspected, and fit tested before it can be worn.

The subjects of training in this module are cleaning, disinfecting, inspecting, and fit testing a dual cartridge, half-face, air-purifying respirator. These aspects make up only part of the respiratory protection program. To be considered fully trained in respiratory protection, the respirator wearer must also be instructed in: (1) how to select a mask and cartridge appropriate to the hazard; (2) the nature of the hazard; and (3) the limitations of wearing and using the respirator. These last three items are not part of the training covered by this module.

WHAT YOU WILL LEARN

When you finish working through the steps and exercises in this book, you will be able to clean and inspect a dual cartridge, air-purifying respirator, and to perform qualitative fit tests on this type of respirator.



You will learn these aspects about this type of respirator in three lessons:

- o Lesson One

  You will be able to describe how air flows through an air-purifying respirator, and to disassemble an air-purifying respirator and tell how each part works or functions.

- o Lesson Two

  You will be able to clean and inspect each part of the air-purifying respirator, and to reassemble it for storage or use.

- o Lesson Three

  You will be able to fit an air-purifying respirator so it makes a proper seal on your face, and, using a chemical cartridge respirator, test that fit using three types of qualitative fit tests: the positive pressure test, the negative pressure test, and a fit test using isoamyl acetate vapor (banana oil).

LESSON ONE

OBJECTIVE

You will be able to describe how air flows through an air-purifying respirator, and to disassemble an air-purifying respirator and tell how each part works or functions.

WHERE AND HOW TO PRACTICE

You should practice doing this lesson on a table or desk where there is room to spread out parts and also this book. So that you do not have to move your practice location once you disassemble the respirator for cleaning, select a practice location close to a supply of hot water. Read through each step before attempting to do it, and make sure you can perform the step as well as described in "How Well You Must Do." Practice labeling parts by using the diagrams in "Exercises."

HOW WELL YOU MUST DO

You must be able to name all parts of the air-purifying respirator, disassemble it to the point described in the lesson, and describe in your own words how the respirator and its parts function. Cover all the points made in the lesson about each part.

THINGS YOU NEED

You will need a NIOSH-approved dual cartridge air-purifying respirator such as the Norton 7500 series or the Willson 1200 series respirators,* including organic vapor cartridges.

Instructions: Now turn to the next page and begin work on Lesson One, "Getting There--Steps."

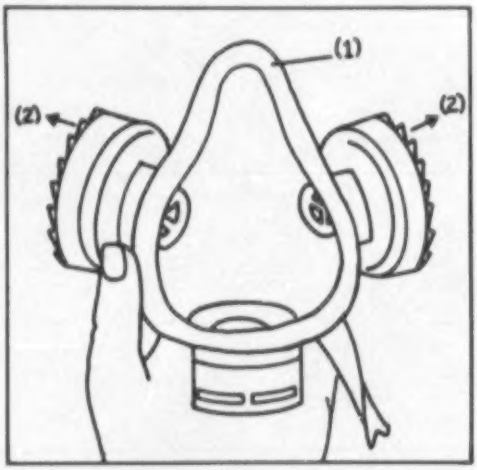
*Presentation of information in this module on any type or model of equipment should not be construed as an endorsement of the equipment by the U.S. Department of Education.

GETTING THERE--STEPS

STEP 1

To find out how the air-purifying cartridge respirator works, pick up the mask so the narrow portion (1) is pointed upward and the chemical cartridges are facing away (2). With the head straps draped over the cartridges, hold the mask with the palm of your hand facing you, with four fingers on the front side of the mask.

KEY POINT 1

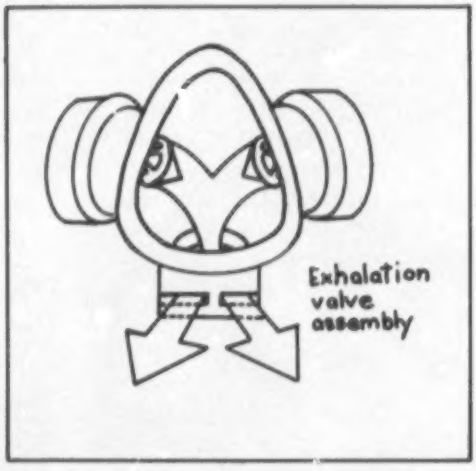


Pick up the mask so the open side of the facepiece is toward you.

STEP 2

Take a deep breath and firmly place the mask over your nose and mouth. Breathe out. Feel the air rushing through the openings of the exhalation valve assembly on the bottom of the mask.

KEY POINT 2



Air leaves the mask through the exhalation valve.

STEP 3

Holding the mask so the palms of both hands cover the cartridges completely, exhale. Now try taking a breath. It should be very difficult if you are holding the mask tightly enough against your face, and if the cartridges are sealed with your hands. Because you are not using the headbands, some air may enter the mask from leaks around the edges. Proper fitting of the mask will be discussed in Lesson Three.

KEY POINT 3

Air should enter the mask only through the cartridges.

STEP 4

Place the mask on your table or desk so that the narrow part is away from you and the cartridges are pointed up. You are now looking at the front side of the mask. Unscrew the cartridges. Among the most routinely used chemical cartridges are those designed for filtering out toxic vapors, gases, or mists.

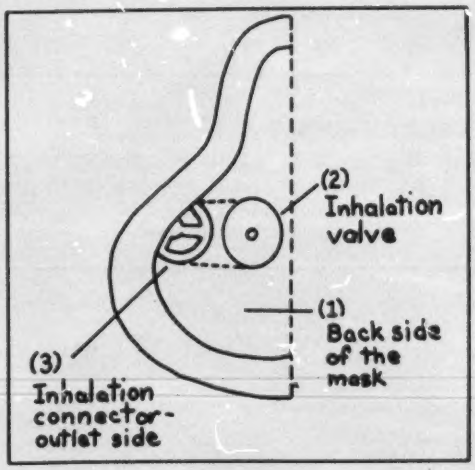
KEY POINT 4

Different cartridges are used to filter different substances.

STEP 5

Pick up the facepiece. Turn it over so the back side (1) is up. Find the thin, round rubbery disk on each side (2). The disk is attached to the outlet side of the inhalation connector (3). This disk is called the inhalation valve. When the wearer of the mask takes a breath, the valve lifts away from the hole. When the wearer exhales, the valve closes the outlet side of the cartridge. The inhalation connector can be removed by pushing it through the mask. Remove the valve and then the connector.

KEY POINT 5

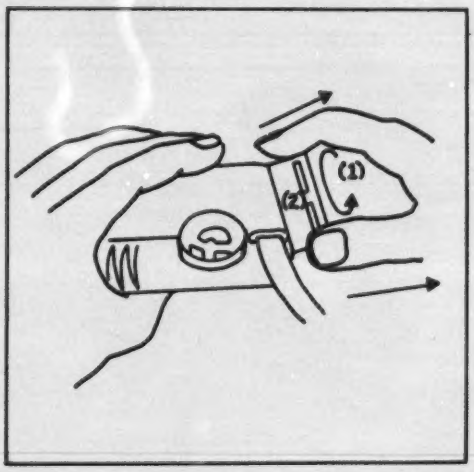


When breath is exhaled, the inhalation valve closes against the inhalation connector.

STEP 6

Turn the facepiece so the exhalation valve assembly (1) is pointed to the right (left if you are left handed). With a turning and pulling motion, remove the flexible plastic exhalation valve cover (2).

KEY POINT 6

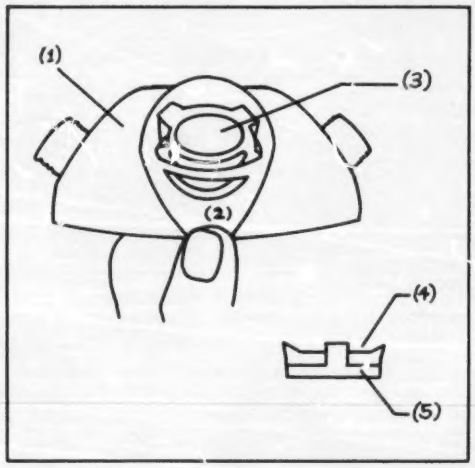


The exhalation valve cover can be easily removed.

STEP 7

Turn the mask so the exhalation valve assembly is facing toward you and the front side of the facepiece is upward (1). With your thumb holding down the front edge of the assembly (2), remove the exhalation valve (3). Handle it carefully to keep from tearing the fragile thin diaphragm (4) away from the gasket-like base (5) of the valve.*

KEY POINT 7

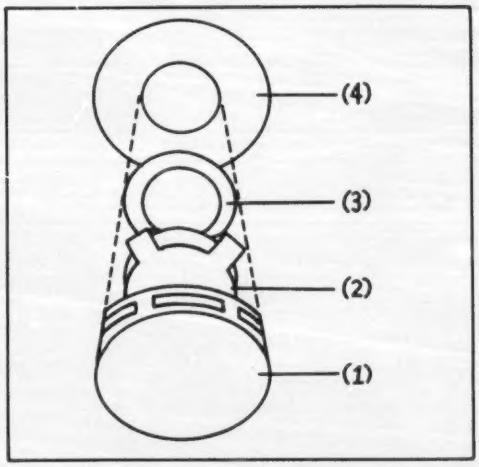


Remove the fragile exhalation valve carefully to prevent tearing the diaphragm.

STEP 8

With the exhalation valve assembly cover (1) and valve (2) removed, hold the mask as you did in Step 7. From the inside of the mask, push the exhalation valve seat (3) out of the rubber housing (4).

KEY POINT 8



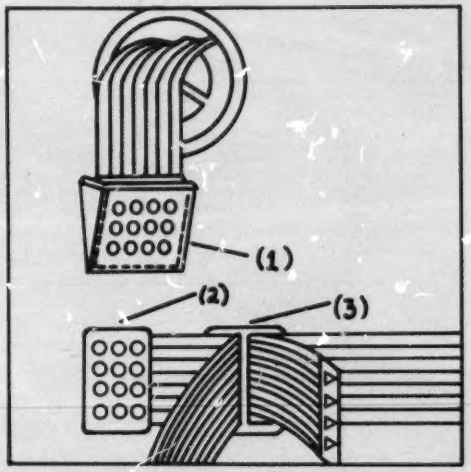
The exhalation valve assembly consists of four components.

*If you are using a different type of air-purifying respirator, the exhalation valve may not be the same as that described.

STEP 9

The respirator has four head straps--three short and one long--for adjusting the tightness of the mask against the face. Each strap is inserted into a molded groove (1) in the facepiece by means of a metal attachment (2) to the strap. The length of each strap can be adjusted using the slider or buckle (3). After removing each strap, the mask and parts will be ready for cleaning and disinfecting.

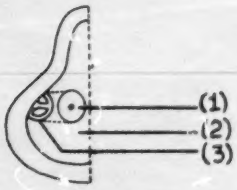
KEY POINT 9



The tightness of the mask is adjusted using the four head straps.

EXERCISES

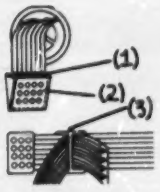
Instruction 1: With the respirator parts in front of you, practice naming each. Then label the following drawings to test your knowledge.



(1) _____

(2) _____

(3) _____



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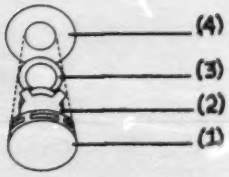
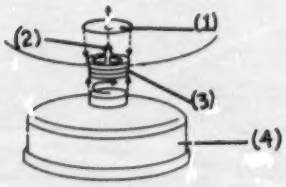


(1) _____

(2) _____

(3) _____

(4) _____

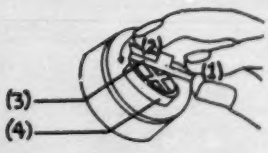


(1) _____

(2) _____

(3) _____

(4) _____



(1) _____

(2) _____

(3) _____

(4) _____

Instruction 2: Repeat Lesson One using an air-purifying respirator made by a different manufacturer. Point out what differences there may be in each part. If there are great differences, look at the manufacturer's operating manual for a description of the part and how it is used.

Instruction 3: When you have correctly labeled each drawing and can tell what each part is and how it works, you are ready to begin work on Lesson Two.

LESSON TWO

OBJECTIVE

You will be able to clean and inspect each part of the air-purifying respirator, and to reassemble it for storage or use.

WHERE AND HOW TO PRACTICE

Continue using the area you selected for practicing Lesson One. Before doing any actual cleaning or reassembly of the respirator, carefully read each step. If you have any question about how to perform any step in this lesson, request help from your instructor. When you complete this lesson, the respirator must work properly to provide the protection it was designed to give.

HOW WELL YOU MUST DO

You must be able to clean an air-purifying respirator so that all surfaces are free from chemical residues, grease, hair, or other matter, and to reassemble the respirator so that it functions as it was designed. Complete the step in Lesson Two in 15 minutes. (Time required for air drying the respirator is not included.)

Note: This lesson only provides instruction in washing respirators by hand, although commercial washing machines generally are used in large operations.

THINGS YOU NEED

In addition to the respirator you have been using, you will need the following:

- wide-mouth containers, two, at least 2-quart capacity (2 to 3 liters)
- mild detergent, preferably liquid, 2 ounces (60 milliliters)
- soft bristle brush
- disinfecting solution, 50 ppm chlorine (1 tablespoon of liquid bleach to 1/2 gallon of water--5 ml to 2 liters)
- thermometer
- resealable plastic bag (8 by 10 inches).

Instructions: Now turn to the next page and begin work on Lesson Two, "Getting There--Steps."

GETTING THERE--STEPS

STEP	KEY POINT
STEP 1 Fill the two containers with hot water no warmer than 60° C (140° F). Add detergent to one of the two containers. Place the facepiece, exhalation valve assembly, and inhalation valve into the soapy solution. Soak for 5 to 10 minutes and then use a soft bristle brush to finish cleaning. Rinse all parts thoroughly in the other container of hot water. The facepiece and valves must be free of all residues and materials that could prevent the valves from making complete seals.	KEY POINT 1 Wash the mask (without cartridges) and head straps in hot soapy water and rinse thoroughly in clean hot water.
STEP 2 If the respirator you are using has been or will be used by someone else, it must be disinfected after cleaning. Rinse the mask at least 2 minutes in disinfecting solution not warmer than 60° C (140° F). Then rinse the mask in clean hot water to remove all traces of detergents and disinfectants. Allow the mask and parts to air dry.	KEY POINT 2 After disinfecting the mask, rinse it thoroughly in hot water.

STEP 3

Inspect the completely dried respirator. First, examine the facepiece for: cracks, tears, holes, or changes in shape from improper storage; inability to stretch the rubber without cracking; and foreign materials such as grease buildups or caked-on materials that may not have been removed during cleaning.

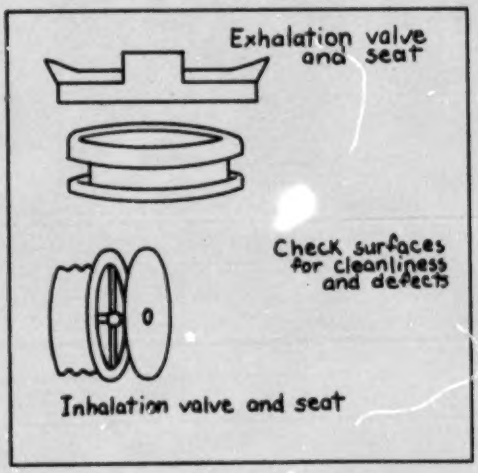
KEY POINT 3

Examine the facepiece for cleanliness, flexibility, and absence of damage.

STEP 4

Second, examine the inhalation valves for: buildups of grease, dust, hair, chemicals, or residues; and cracks, tears, or changes in the shape of the soft rubbery material. Check the hard plastic valve seats or connectors for cracks, breaks, or chips, particularly in the surfaces that make contact with the valve diaphragms.

KEY POINT 4

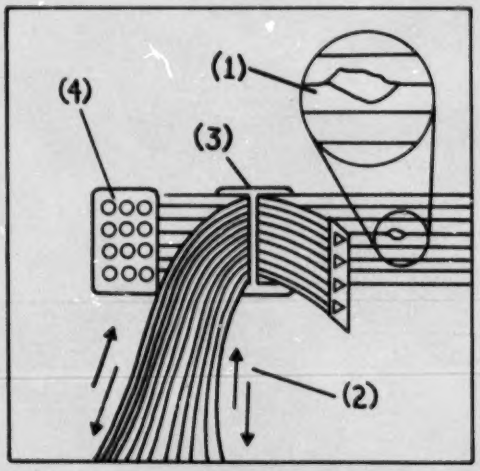


Check valves and seats for cleanliness and damage that would prevent proper sealing.

STEP 5

Third, examine the headband or straps for: breaks (1); loss of elasticity (ability to be stretched) (2); damaged sliders or buckles (3); and attachments (4). Proper fit of the respirator is partly achieved by using headstraps that are not defective; fitting will be discussed in Lesson Three.

KEY POINT 5



Headbands in good shape are important for properly fitting the respirator for wear.

STEP 6

Fourth, examine the air-purifying cartridges. If any doubt exists as to whether the cartridges have been used or for how long they were used, obtain others. Cartridges should be examined for: evidence of cross-threading (damaged threads) and missing gaskets; cracks or dents on the outside of the filter case; and appropriateness of the cartridge for the hazard from which you are seeking protection.*

KEY POINT 6

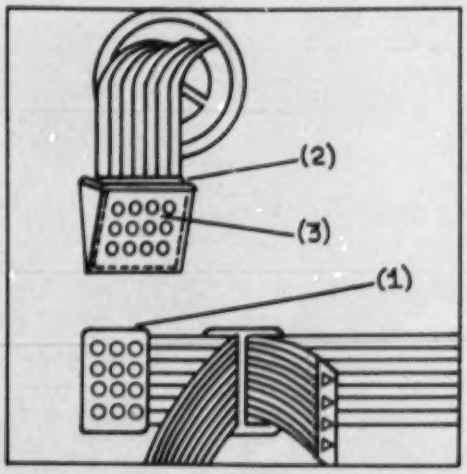
Only use cartridges that you are sure are still good.

*Selecting appropriate cartridges is not included as a topic in this module. Your instructor will need to provide either the information or a source for that information.

STEP 7

After inspecting the respirator parts, begin reassembling the respirator. Grasp a headband strap by the metal attachment (1). Push it into the molded groove (2) in the facepiece until all of the metal piece is is hidden (3). The long head strap should be inserted into either of the two grooves at the top (narrow end) of the facepiece.

KEY POINT 7

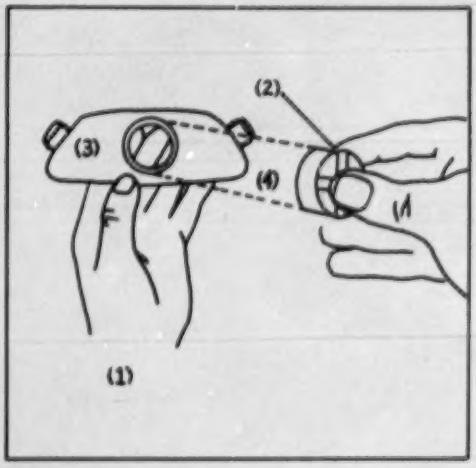


Insert headband straps completely into their holders.

STEP 8

Hold the facepiece with the exhalation valve assembly housing facing you (1). Pick up the exhalation valve seat (2) with your free hand. With the fingers inside the mask (3), push against the inside of the housing while you insert the valve seat through the front of the mask (4).

KEY POINT 8

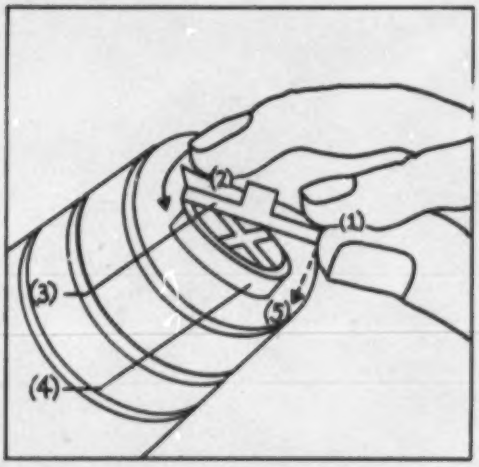


Insert the exhalation valve seat through the front of the mask.

STEP 9

Hold the facepiece as you did in Step 8. Using the thumb and forefinger of your free hand, pinch a tab (1) of the valve. With the middle finger (2) of the same hand, push the back edge (3) of the gasketlike portion of the valve down over the valve seat (4). Still pinching the tab, stretch the valve over the opposite edge of the seat (5). Push the other side of the valve onto the seat as far as it will go.

KEY POINT 9



Push the gasketlike portion of the valve as far back on the valve seat as it will go.

STEP 10

Pick up the exhalation valve cover. Push and turn the cover onto the exhalation valve assembly housing. Make sure the die-cut (factory produced) holes in the cover are not blocked by the edge of the housing.

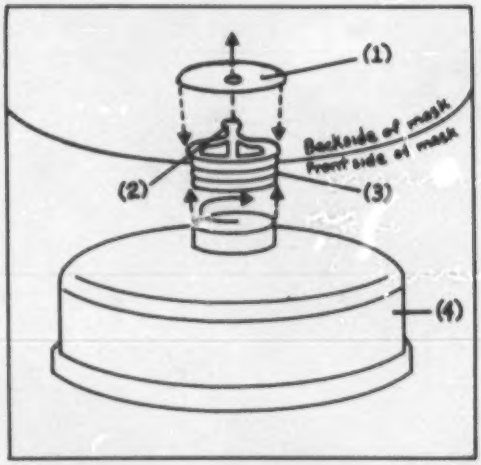
KEY POINT 10

Holes on the cover must remain completely open.

STEP 11

Holding the mask backside upward with one hand, pick up the inhalation valve (1) with the other hand. Push the inhalation valve onto the stem (2) of the inhalation connector (3) on the inside of the mask. Finally, screw the cartridge (4) onto the inhalation connector. Make sure the cartridge is not cross-threaded and that it is tightly fastened to the mask. This completes reassembly of the mask.

KEY POINT 11



STEP 12

If you are not going to use the respirator right away, place it in a clean resealable plastic bag. Store the respirator in the bag away from sunlight, heat, extreme cold, excessive moisture, chemicals, and in a place where it will not be physically damaged. If masks cannot be stored individually, place a storage form in each mask or stuff each mask with paper to prevent it from getting crushed, folded, or creased.

KEY POINT 12

Store the clean respirator in a plastic bag in a storage cabinet when possible. Make sure the mask will not be crushed, folded, or creased during storage.

LESSON TWO

EXERCISES

Instruction 1: Practice disassembling, cleaning, inspecting, and reassembling the respirator with which you have been working. Work toward completing the steps in Lessons One and Two within 20 minutes. (Drying time is not included in the 20 minutes.)

Instruction 2: Repeat Instruction 1 using a respirator of a different manufacturer.

LESSON THREE

OBJECTIVE

You will be able to fit an air-purifying respirator so it makes a proper seal on your face, and, using a chemical cartridge respirator, test that fit using three types of qualitative fit tests: the positive pressure test, the negative pressure test, and a fit test using isoamyl acetate vapor (banana oil).

WHERE AND HOW TO PRACTICE

Practice this lesson in a room with good air circulation. To properly perform the fit test using banana oil, you should not breathe the banana oil vapors before you put the respirator on. If you need to perform the banana oil fit test using another respirator, allow time for the vapors to leave the room or go to a room where the vapors are not present.

HOW WELL YOU MUST DO

The mask must: (1) remain collapsed 10 seconds in the negative fit test; (2) not leak air out of the facepiece in the positive fit test; and (3) provide a good seal so that banana oil vapors cannot be detected inside the mask. Perform all three tests within 10 minutes.

THINGS YOU NEED

In addition to the respirator you have been using, the following will also be needed:

- isoamyl acetate (banana oil) ampule
- cotton swabs

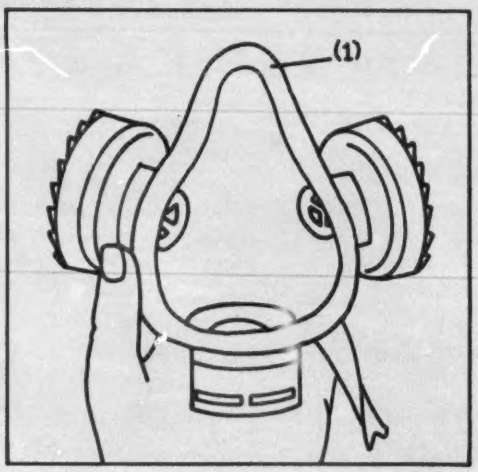
Instructions: Now turn to the next page and begin work on Lesson Three, "Getting There--Steps."

GETTING THERE--STEPS

STEP 1

Determine if the skin of your face makes contact with the edge (1) of the respirator. With one hand, place the facepiece over your nose and mouth. With the index finger of your other hand, trace the outside edge (1) of the facepiece where it makes contact with your skin. If the facepiece does not make proper contact, the respirator may not be the right size and/or facial hair may be covering the skin. Where hair covers skin at any place along that edge, an adequate facepiece-to-face seal will not be possible. The respirator will leak. If you wear glasses, the frames must not interfere with the respirator fit.

KEY POINT 1

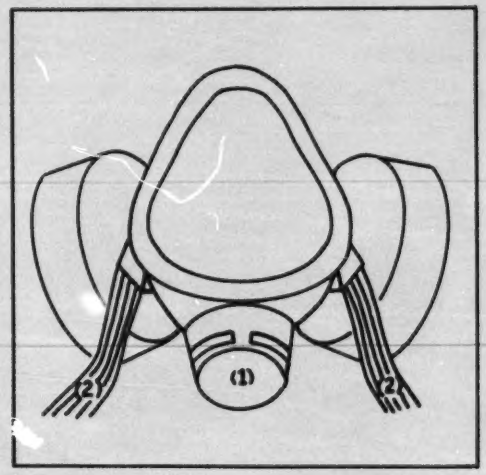


Facial skin must make contact with the entire outside edge of the respirator to keep the mask from leaking.

STEP 2

When your respirator makes the fit described in Step 1, place the respirator backside up with the exhalation valve assembly pointed toward you (1). Grasp the two head straps (2) closest to the exhalation valve assembly and lift the respirator to your face. Stretch the head straps behind your head and connect them. Similarly, connect the two remaining head straps behind your head.

KEY POINT 2

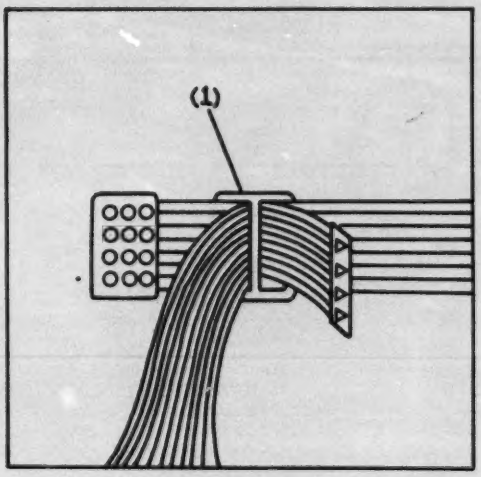


Connect both sets of head straps behind your head.

STEP 3

The next step in performing any fit test is to adjust the head straps so they are as comfortable as possible and yet keep a seal between the facepiece and your skin. Adjust the slider (1) to tighten the straps. If the straps are too tight, the respirator will become annoying very quickly.

KEY POINT 3



Tighten the straps to prevent leaks but not too tightly to cause the respirator to fit uncomfortably.

STEP 4

Perform the negative pressure test. While wearing the mask, cover the inlets of the cartridges by covering them with your palms (1). Inhale gently. The facepiece should collapse slightly. Hold your breath 10 seconds. If during that time the facepiece remains slightly collapsed, the respirator is on tightly enough to provide a good facepiece-to-face seal.

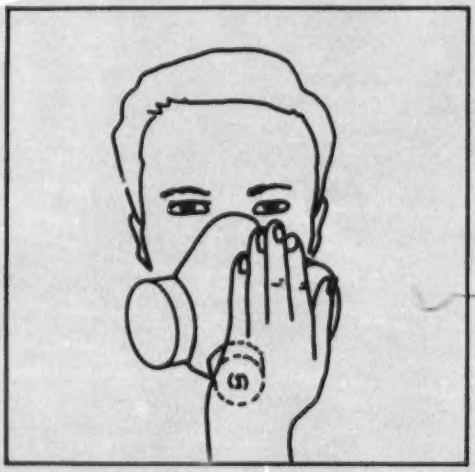
KEY POINT 4

In the negative pressure fit test, the mask should remain slightly collapsed for 10 seconds after inhaling.

STEP 5

Perform the positive pressure test. While wearing the respirator, turn and pull off the exhalation valve assembly cover (1). With the palm of your hand, seal the valve. Take a deep breath. Gently exhale a little of the air you inhaled and hold the rest for 10 seconds. If the mask fits properly, the facepiece will feel like it may pop away from your face.

KEY POINT 5



In the positive pressure fit test, the pressure of exhaled air should remain built up inside the mask for 10 seconds after exhaling.

STEP 6	KEY POINT 6
Perform a fit test using banana oil. Make sure the respirator cartridges are the organic vapor type. Put the respirator on. Break the tip off an ampule containing banana oil. Wet a cotton swab with the oil.	Put the respirator on before breathing the banana oil ampule, and before entering the air where banana oil is being used.
STEP 7	KEY POINT 7
Pass the banana oil wet swab around the edge of the respirator where it makes a seal with your face. If you smell the oil inside the mask, readjust the head straps. If that has no effect and you cannot find the leak, switch to another size respirator of the same model. Repeat Steps 6 and 7. If you still smell the oil, switch to a different brand of respirator and repeat all the steps in this lesson.	If you smell the oil inside the mask, first readjust the head straps. If you cannot find the leaks, switch to another respirator.

LESSON THREE

EXERCISES

Instruction 1: Practice each fit test until you can perform all three within 10 minutes.

Instruction 2: Repeat Instruction 1 using a respirator of a different manufacturer.

PERFORMANCE TEST

Instruction 1: Check your skill level or progress by working through each of the items in this test. If you can perform each item as well as required, place a check in the space provided. When all of the items are checked, you are ready to demonstrate your skills to your instructor. You may use the following list if needed. You will be considered trained in a skill after your instructor approves your performance of each of the following items.

CLEANING, INSPECTING, AND REASSEMBLING DUAL CARTRIDGE, AIR-PURIFYING RESPIRATORS

Instruction 2: As you do each inspection item, tell the instructor what it is you are checking.

No. 1 ____ Wash the respirator in hot water less than 60° C (140° F).

No. 2 ____ Disinfect the respirator using 50 ppm chlorine solution.

No. 3 ____ Check the sealing surfaces of each part to make sure they are completely free of residues, grease, hair, or caked-on materials.

No. 4 ____ Check the respirator facepiece to see that it is completely free from cracks, holes, and tears, and has not changed in shape.

No. 5 ____ Check the valves to see that they are completely clean, not damaged, and have not changed shape.

No. 6 ____ Check the hard plastic valve seats for damage and change in the shape of the surface.

No. 7 ____ Check the head straps for damage and loss of elasticity.

No. 8 ____ Check the cartridges for usability including damage, missing gasket, and evidence of cross-threading.

No. 9 ____ Replace the head straps so the metal piece is inserted all the way into the molded groove in the facepiece.

No. 10 ____ Replace the longest head strap in a groove at the top of the respirator.

No. 11 ____ Replace the exhalation valve so that it forms a complete seal with the exhalation valve seat.

No. 12 ____ Replace the exhalation valve assembly cover so that all die-cut holes are open.

PERFORMANCE TEST

No. 13 ____ Replace each part of the exhalation valve assembly in the proper order.

No. 14 ____ Replace the inhalation valve so that it can make a complete seal with the seat of the inhalation connector.

No. 15 ____ Replace each cartridge tightly without cross-threading.

No. 16 ____ Place the respirator in a clean resealable plastic bag and store in an appropriate location away from temperature extremes, sunlight, moisture, and chemicals.

No. 17 ____ Store the mask so as to prevent folding, creasing, or crushing.

FOR FURTHER STUDY

If you could not perform one or more of the 17 items above, review and practice the following lesson steps:

No. 1
Lesson Two, Step 1

No. 2
Lesson Two, Step 2

No. 3
Lesson Two, Steps 1 through 4

No. 4
Lesson Two, Step 3

No. 5
Lesson Two, Step 4

No. 6
Lesson Two, Step 4

No. 7
Lesson Two, Step 5

No. 8
Lesson Two, Step 6

No. 9
Lesson Two, Step 7

No. 10
Lesson Two, Step 7

PERFORMANCE TEST

No. 11
Lesson Two, Step 9

No. 12
Lesson Two, Step 10

No. 13
Lesson Two, Steps 8 through 10

No. 14
Lesson Two, Step 11

No. 15
Lesson Two, Step 11

No. 16
Lesson Two, Step 12

No. 17
Lesson Two, Step 12

PERFORMING QUALITATIVE FIT TESTS

No. 1 _____ Check to see that your facial skin makes contact with the entire outside edge of the respirator.

No. 2 _____ Perform the negative fit test so that the facepiece remains slightly collapsed for 10 seconds.

No. 3 _____ Perform the positive fit test so that the pressure of exhaled air remains in the mask for 10 seconds.

No. 4 _____ Perform the fit test using banana oil by doing each step so the banana oil vapors are not breathed in accidentally.

FOR FURTHER STUDY

If you could not perform one or more of the four items above, review and practice the following lesson steps:

No. 1
Lesson Three, Step 1

No. 2
Lesson Three, Step 4

No. 3
Lesson Three, Step 5

No. 4
Lesson Three, Steps 6 and 7

REFERENCES

U.S. Army, Field Manual, FM 8-91S1/2, Soldier's Manual, MOS 91S, Environmental Health Specialist, Washington, D.C., August 1977.

U.S. Department of Health, Education, and Welfare, National Institute for Occupational Safety and Health. A Guide to Industrial Respiratory Protection, Cincinnati, Ohio, June 1976. HEW Public. No. (NIOSH 76-189)

U.S. Department of Labor, Industrial Hygiene Field Operations Manual, OSHA Instruction CPL 2-2.20, April 2, 1979.